

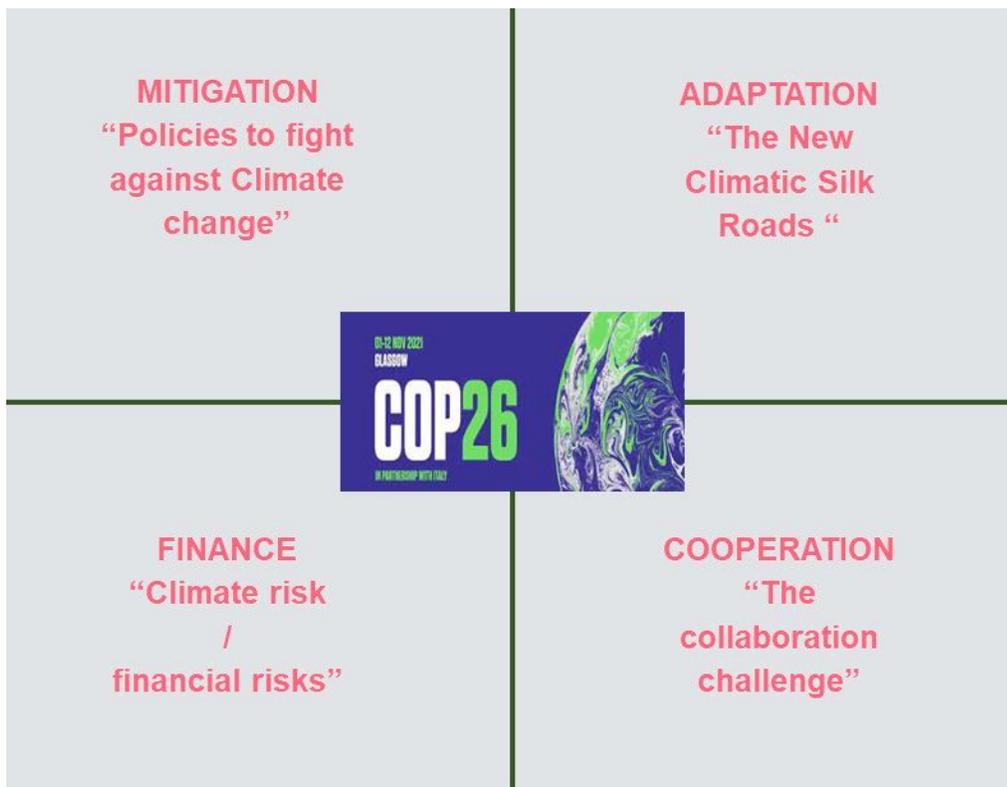
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COP26 // October 26, 2021

COP26: Finance facing the risk of climate change

Ahead of the COP26 that will start in November, we investigated a series of issues linked to environment.

We organized our ideas around four themes: mitigation, adaptation, finance and cooperation.

This publication brings together those four papers.



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MITIGATION

Policies to fight against global warming

The efforts made so far in the fight against global warming are proving to be woefully insufficient according to the international energy agency. COP 26, which takes place in Glasgow in November, will be a key moment in raising targets for reducing greenhouse gas emissions and setting ambitious interim targets. Beyond these long-term promises, the urgency is to act concretely, massively and in a coordinated manner to limit the rise in temperatures to less than 2 degrees compared to the pre-industrial era by the end of the century. An essential and effective tool to achieve this is carbon pricing. To this must be added public policies to achieve a just transition and to invest massively in the energy transition.

What is climate change mitigation?

Climate change mitigation involves taking measures to limit global warming and thus its economic, social and environmental consequences.

To this end, measures must be taken to reduce and prevent greenhouse gas emissions into the atmosphere responsible for global warming. This can be done in two ways: either by reducing the source of these gases, such as the combustion of fossil fuels, and by developing clean energies (solar, wind, hydrogen, etc.), or by improving the capacity of sinks to store these gases. There are natural carbon sinks such as developing forests, soils and oceans whose capacity to store gases must be improved (planting trees, limiting deforestation, etc.). New techniques are also currently developed to artificially capture carbon and "trap" it in the rock, which requires significant investment (example of Canada) and additional research and innovation.



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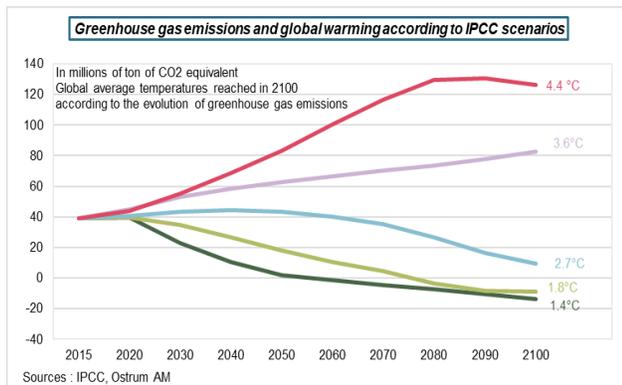
Measures to reduce greenhouse gas emissions and to develop or improve the capacity of carbon sinks to the remaining emissions will achieve climate neutrality (net zero CO₂ emissions). In order to respect the Paris Agreement, these measures must ensure that the rise in average temperatures by the end of the century remains well below 2 degrees compared to the pre-industrial era and is limited to 1.5 degrees. The efforts made so far are woefully insufficient according to the latest report from the Intergovernmental Panel on Climate Change (IPCC) published in August.

Very insufficient objectives

In order to limit global warming, 113 countries, among the 196 signatories to the Paris Agreement, have announced new greenhouse gas reduction targets or have strengthened them. These remain insufficient, as a recent United Nations report reveals. Greenhouse gas emissions for these countries would only decrease by 12% in 2030, compared to 2010, while according to the IPCC a reduction of 45% would be necessary in order to limit global warming to 1.5 degrees by 2100, or a 25% drop to limit it to 2 degrees. Of these countries, 70 have committed to achieving climate neutrality by mid-century, which would further reduce these emissions (-26% by 2030).

What is much more worrying is that by taking into account these new and revised targets, and those available for other countries, the greenhouse gas emissions of the 196 countries that have signed the Paris Agreement would increase by 16% by 2030, compared to 2010, which would correspond to an increase in average temperatures of 2.7

degrees, compared to the pre-industrial era, according to the IPCC scenarios (the blue curve on the graph). We are far from the 1.5 degrees targeted by the Paris agreement.



One of the challenges of COP 26, which is being held in Glasgow from November 1 to 12, will be for countries to set much more ambitious greenhouse gas reduction targets and intermediate targets to comply with the Paris agreement with a view to achieving climate neutrality by 2050.

It is essential that developed countries help emerging countries to make their energy transition. These developing countries are very dependent on the combustion of fossil fuels and do not have sufficient means to make their energy transition. Within this framework, developed countries made a commitment 10 years ago to provide aid to developing countries of \$ 100 billion per year from 2020, which has not been honored. This is proving to be a crucial element in achieving the peak in global emissions by 2030.

In addition, very few countries have enshrined these objectives in law, which makes them non-binding. In this context, the European Union is a pioneer among the major economies¹. Since 2015, it has set itself ambitious greenhouse gas reduction targets that it even exceeded in 2020 and strengthened for 2030 by bringing them to -55% compared to 1990 (compared to -40% previously set). This reinforced intermediate objective and the achievement of climate neutrality by 2050 are enshrined in European climate law. This is part of the 'Green deal' presented in December 2019 as a growth strategy aimed at transforming the European economy with the aim of achieving climate neutrality by 2050.

The announcement of ambitious greenhouse gas emission reduction targets by governments is a necessary step. The urgency is to adopt concrete, massive and coordinated actions to accelerate the energy transition and thus reduce

global warming to less than 2 degrees by the end of the century.

Setting a carbon price

An essential, simple and effective tool

The easiest and fastest tool to encourage countries to reduce their greenhouse gas emissions and get them to develop clean energy is to put a price on carbon. Carbon pricing makes it possible to make carbon-intensive products more expensive compared to those with lower carbon intensity and thus increase energy efficiency. Revenues from carbon tax and allowance trading systems can be used to finance part of green investments or offset the loss of purchasing power of households most affected by the introduction of these additional tariffs. In 2020, revenues from carbon pricing amounted to \$ 53 billion according to the World Bank.

Functioning

This can be done in two ways: either by a carbon tax on the carbon content of products or the CO₂ emissions that result from their production, or by setting up an emission trading system. In this case, companies must obtain permits for each ton of CO₂ emitted. These authorizations are limited by governments and companies can exchange them by buying or selling them on a market which determines the price of carbon.

What is the situation today?

More than 60 initiatives such as the carbon tax and emissions trading systems currently exist. They were spread in 2020 in 121 countries, 24 regions and 708 cities. This number has tripled in the space of 10 years and two new initiatives have emerged in 2021 with the establishment of a carbon tax in Germany and a national emissions trading system in China. Although growing significantly, these initiatives only cover 21.4% of greenhouse gas emissions, according to the World Bank, which is insufficient to achieve climate neutrality by 2050.

In addition, the territorial coverage of sectors and tariffs are very heterogeneous from one country to another such that the global average carbon price is only \$ 3 per ton according to the IMF. This tariff clearly does not encourage companies to change their production process to disengage from fossil fuels and invest in green energies. This is a far cry from the \$ 75 per ton of CO₂ by 2030 to limit the rise in temperatures

¹ <https://www.ostrum.com/en/publication/mystratweekly-29th-march-2021>

to 2 degrees according to the IMF. Carbon pricing must therefore be improved. In particular, it is necessary to take measures aimed at reassuring companies in carbon-intensive sectors as to the possible losses of competitiveness that would be suffered for the benefit of countries with lower carbon prices due in particular to lower environmental standards. Two avenues are currently being considered. The European Union is calling for a border carbon pricing system and the IMF for a global floor price.

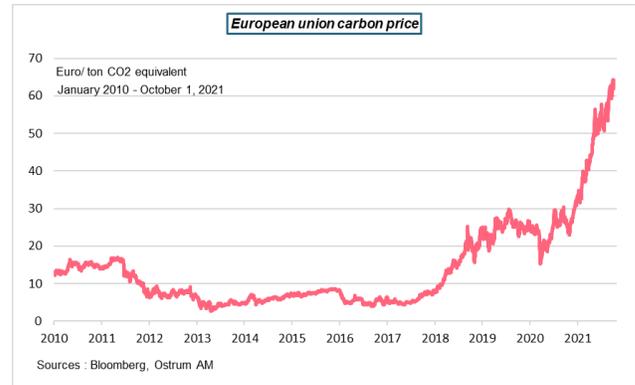
The EU emission quota trading system

Created in 2005, the European Union's emissions trading system is the first and largest carbon market. It is therefore often taken as a benchmark for carbon pricing. This system sets a ceiling on greenhouse gas emissions for certain industries each year, which gradually decreases. Companies receive or buy these allowances and can trade them according to their needs. Each year, companies must surrender as many allowances as the emissions observed the previous year. Those who have used more allowances than what was allocated to them can buy the surplus allowances from less polluting companies. This market thus determines the price of carbon (1 quota being equal to 1 ton of CO₂). Since its introduction in 2005, it has resulted in a 43% reduction in greenhouse gas emissions in the sectors covered. It currently covers 41% of the EU's greenhouse gas emissions.

Sharp rise in the price of carbon in the EU

Until 2018, the price of carbon remained at low levels due in particular to an excess of allocated allowances. The European Union has improved its functioning since then and prices started to increase in 2018 to reach 30 euros per ton in 2019, against 5 euros on average between 2016 and mid-2017.

After a plunge from March to May 2020, linked to the virtual cessation of activity following the containment measures put in place to deal with the Covid-19 epidemic, the price of carbon has risen sharply to settle on October 1st 2021 at \$ 62 per ton of CO₂, against \$ 32.6 at the end of 2020. This results from the resumption of activity linked to the gradual lifting of health restriction measures but also and above all to measures announced by the European Union to accelerate the energy transition with, in particular, a more ambitious intermediate objective of reducing greenhouse gas emissions by 2030 (-55% compared to 1990, against -40% previously set), which suggests a reduction of emission allowances.



Another factor has also played a role recently: the sharp rise in the price of natural gas in Europe following an insufficient supply to meet the sharp increase in demand. This is happening in early fall and the high price of natural gas is raising fears of increased demand for coal this winter from households and businesses for heating and electricity. This will likely generate greater demand for CO₂ emission allowances from certain companies, which will weigh on carbon prices.

Need for improvement of the EU carbon market

This system currently covers only 41% of greenhouse gas emissions. It concerns the production of electricity and heat, energy-intensive industrial sectors and aviation in Europe. In addition, according to the European Court of Auditors, 40% of allowances are distributed free of charge to companies, especially those in the aviation industry. This aims in particular to avoid "carbon leaks" whereby companies relocate their production to avoid this additional cost.

The European Commission made a proposal last July aimed in particular at gradually eliminating the free allowances distributed to the aviation sector for full auctioning in 2027. It also aims to integrate other sectors such as maritime transport and to create another allowance trading system (which would be operational from 2026) covering emissions from the construction sector and from fuel suppliers for road transport. To compensate for any repercussions on consumers, the EC has also proposed the creation of a social climate fund for the most vulnerable households.

To achieve these more ambitious energy transition objectives, the EC has also announced a new emission reduction target for the sectors covered by the emissions trading system: -61% by 2030, compared to the level of 2005, against -43% previously. This will translate into lower emission allowances and an acceleration in the rate of annual emissions contraction to 4.2%, from the current 2.2%, according to the EC.

Border carbon adjustment mechanism

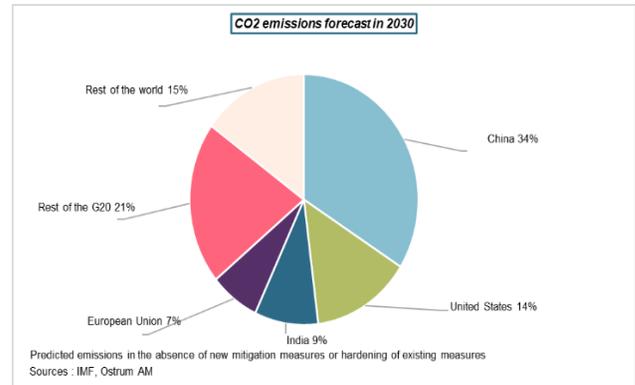
The European Union also proposed on July 14 the establishment of a carbon border adjustment mechanism compatible with WTO rules. As the European Union strengthens its regulation in order to achieve climate neutrality, the risk is that some EU companies will outsource their carbon-intensive production to third countries with lower environmental standards or that certain products manufactured by the EU are replaced by more carbon intensive imports. This would ultimately result in an increase in greenhouse gas emissions in third countries offsetting the reduction made in the European Union, which is contrary to the initial objective. This would also operate to the detriment of the competitiveness of European producers subject to higher carbon prices than third countries.

This border carbon adjustment mechanism will initially apply to cement, iron, steel, aluminum, fertilizers and electricity. Companies based in third countries supplying high carbon intensity products to the EU will have to purchase carbon certificates based on the carbon price they would have had to pay if the products had been produced under EU rules. If these producers are able to prove that they have already paid a carbon price, it will be deducted.

A carbon border adjustment mechanism is already in place in some regions, such as California for certain electricity imports, and is under study in Canada and Japan in particular. Russia and China are among the countries that have been very critical of this new mechanism, with Russia considering that it is one of the most affected by its implementation (to the tune of \$ 7.6 billion), it being the largest supplier of carbon-intensive products to the EU. The additional costs would also be significant for Turkey.

IMF calls for international carbon price floor mechanism

To avoid losses of competitiveness for countries adopting high levels of carbon prices and reduce their uncertainty regarding the behavior of other countries, the IMF proposes the establishment of a floor price for carbon at the international level. It would initially only concern the largest emitters and the level of pricing would be adapted according to the level of development of the countries and their emissions. Emissions from China, the United States, India and the European Union will represent more than 60% of global emissions in 2030 according to the IMF.



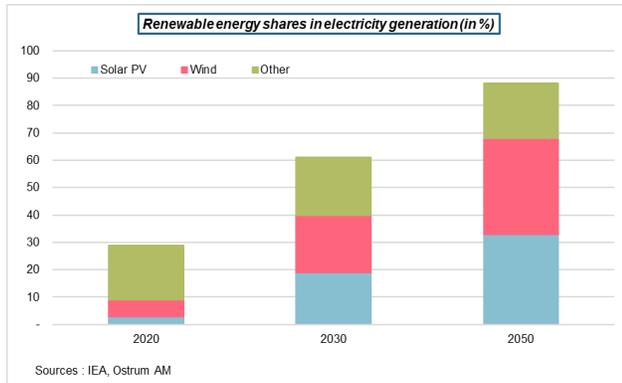
The IMF takes as an example the participation of 6 countries: Canada, China, the United States, India, the United Kingdom and the European Union with a floor price of \$ 75 per ton by 2030 for developed countries, \$ 50 for emerging high income countries and \$ 25 for emerging low income countries. According to the IMF, the participation of these 6 countries in this carbon pricing, as well as the respect by the G20 countries of the Paris agreement, would make it possible to reduce greenhouse gas emissions by 23% by 2030 and to limit global warming to less than 2 degrees compared to the pre-industrial era.

According to the IMF, this system is more effective than a border carbon adjustment mechanism since the carbon embodied in trade flows generally represents less than 10% of countries' total emissions.

Green investments

Massive investments needed

This is an essential element in accelerating the energy transition and making it possible to replace a large part of fossil fuels with clean energies. This implies a major transformation of the means of production and energy systems which are at the origin of 3/4th of greenhouse gas emissions. To achieve carbon neutrality by 2050, nearly 90% of electricity must in particular come from renewable energies according to the IEA, with wind turbines and solar panels expected to represent nearly 70%. In 2020, the share of renewable energies in electricity is only 29%. Electric cars would represent 86% of car stocks in 2050, against 20% in 2030 and 1% in 2020. Fossil energy would drop from 4/5th of the total energy supply today to only 1/5th in 2050.



Beyond infrastructure spending, significant research and development spending is also required. Indeed, while the technologies necessary to meet the emissions reduction targets by 2030 are available, this is far from the case for the targets by 2050, according to the IEA. Half of the necessary technologies are not yet available. They are in the development or prototype phase, which requires significant investment in research and development for them to be brought to market on time. According to the IEA, global investment in clean energy must more than triple by 2030 to reach \$ 4 trillion. 30% of these investments must come from the public sector and 70% from the private sector

Major role of governments

Governments have a major role to play in financing these green investments and helping to attract private investments. The large-scale measures taken by governments to deal with the Covid-19 crisis constitute a real opportunity to increase green investments in a context of low interest rates. In the United States, barely come to power, Joe Biden announced a massive infrastructure plan (\$ 2,300 billion) and a plan for families (\$ 1,800 billion) intended in particular to improve existing infrastructure and to fight against global warming. Faced with the reluctance of the Republicans, these measures have been modified and have not yet been voted².

In Europe, governments have also taken measures to revive their economy, part of which is in the form of investments for the energy transition. They will be partly financed by the European Union through the Next Generation EU recovery plan amounting to 800 billion euros (in current price)³. For the first time, it can borrow heavily on the markets on behalf of all the countries of the European Union and pay a significant portion of the funding in the form of grants (339 billion euros), therefore non-refundable, and another in the form of loans, at favorable rates. To benefit from these

payments, countries have presented recovery and resilience plans that must meet certain criteria: at least 37% of investments must be devoted to the energy transition and at least 20% to the digitization of the economy. In addition, countries have also pledged to adopt structural reforms with the aim of putting their economies on a sustained higher growth path. The first payments from the EU were made in July and represent a pre-financing of 13% of the amounts requested.

According to a recent IEA report, clean energy investments announced by governments represent only 2% of stimulus plans to deal with the Covid 19 crisis (\$ 380 billion in Q2 2021). These amounts and the new measures announced should translate into an increase of \$ 350 billion per year in investments in clean energy between 2021 and 2023. Although up 30% compared to previous years, this is very insufficient in view of the amount of \$ 1 trillion estimated by the IMF and IEA in order to be consistent with the Paris agreement.

Countries will therefore have to significantly increase their investments in clean energy. This comes as a large number of economies have regained, or are on the verge of regaining, pre-crisis GDP levels and will be preparing to gradually reduce their budget support.

Reform of the stability pact in the euro zone and green investments

As activity resumes, it is essential that governments do not consolidate fiscal policy too quickly. Measures must be more targeted towards sectors and people weakened by the health crisis and investments must not be sharply reduced. This is what happened in the Eurozone after the 2008/2009 global economic and financial crisis and was a major factor in its entry into recession in 2012.

In Europe, the rules relating to the Stability and Growth Pact (limiting the public debt to 60% of GDP and the budget deficit to 3% of GDP) were temporarily suspended in 2020 to allow governments to massively boost their economies and limit the impact of the deepest recession since World War II. This resulted in a sharp increase in public deficits: -8% of GDP in 2021 for the Eurozone according to the EC's spring forecasts, against -0.6% in 2019, as well as in public debt: 102.4% forecast in 2021 against 85.8% in 2019.

The reinstatement of the Stability Pact in 2023 should not result in a rapid and marked adjustment in public finances. Discussions have started to reform this pact, the rules of which have often been broken, without being followed by

² <https://www.ostrum.com/en/publication/mystratweekly-july-5th-2021>

³ <https://www.ostrum.com/en/publication/mystratweekly-may-10th-2021>

penalties⁴. This is all the more important given that Europe must invest massively to finance the energy transition and achieve carbon neutrality in 2050. One way to proceed gradually with budgetary consolidation without affecting green investments lies in the fact of reserving them a special treatment by not including them in the public deficit. Discussions promise to be intense because of the reluctance of so-called "frugal" countries attached to respect for fiscal rules by all.

Conclusion

The latest IPCC report made an alarming finding on global warming at work and the urgency to intervene quickly, massively and in a coordinated manner to reduce greenhouse gas emissions and achieve climate neutrality by 2050, in order to respect the Paris Agreement. To achieve this, setting a carbon price is quick and easy, but not sufficient. The various emissions trading and carbon tax systems that exist around the world must be improved to encourage companies to reduce their greenhouse gas emissions. This carbon pricing must be accompanied by massive investments in green energy, with governments having a key role to play in attracting private sector funding and ensuring a just transition. The fiscal consolidation that will take place once the effects of the Covid-19 crisis have passed should therefore not be too rapid and significant at the risk of weakening the recovery and compromising efforts to achieve climate neutrality. In this context, green investments could be the subject of special treatment given the climate challenges.

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⁴ <https://www.ostrum.com/en/publication/mystratweekly-march-15th-2021>

ADAPTATION

«The New climatic Silk Roads» ?

This week at COP26, we will focus on the Belt and Road Initiative (BRI). Criticized for being responsible for the excessive indebtedness of poor countries, the BRI is also a major obstacle to achieving the objectives of the Paris Agreement on Climate. Officially launched in 2013 by President Xi Jinping, this mammoth infrastructure project in 140 countries highlights the impact of such projects on the ecosystem and biodiversity. China has taken important policy initiatives to improve the image of the BRI. Speaking at the UN General Assembly on 21 September, Xi Jinping pledged to stop the construction of new coal mines and support emerging countries in their transition to green and low-carbon energy. However, the recent energy crisis has highlighted the importance of coal for the Chinese economy.

Belt and Road Initiative and the Paris Agreement

Introduction to the Belt and Road Initiative

Officially launched in 2013 by Xi Jinping, the Belt and Road Initiative (BRI), or "Nouvelles routes de la soie" in French, which also refers to One Belt, One Road (OBOR), is the personal priority of the Chinese president.

140 countries⁵ (about 60% of the world's population) are participating in this huge project of investments in transport, energy and telecommunications infrastructure linking Europe, Africa and Asia.

The amount needed for this vast project is estimated at more

⁵ 140 countries were included in the BRI in January 2021 according to the « Green Belt and Road Initiative Center ».



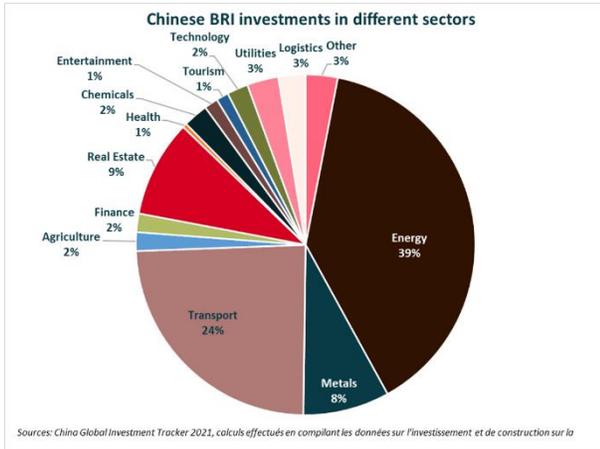
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than \$8000 billion!

The BRI meets several objectives for the Chinese authorities:

- **Economic:** give outlets to Chinese companies that have become in overcapacity (heavy industries) because of the structural economic slowdown. Dominate global trade with the creation of economic corridors that provide rail, marine, road and energy connectivity, among other things.
- **Geopolitics:** BRI is also a way for China to increase its global influence. China has always been an international lender with strategic objectives and its role has grown over the past 20 years. The amount of its receivables amounts to \$5000 billion, or 6% of global GDP. The 50 countries most indebted to China, which are mainly sub-Saharan African countries, owe on average 40% of their external debt to China. ⁶
- **Security, especially energy.** The goal is to secure its energy supplies because China is still very dependent on the rest of the world in this area.

Moreover, the energy (39%) and transport (24%) sectors are the priorities of Chinese investment under the BRI, as shown in the chart below.



Between 2013 and 2020, China has already invested more than \$770 billion in many sectors across the BRI⁷.

Investments in energy result in the development of infrastructure in conventional and renewable energies.

However, most of the Chinese financing in the energy sector goes to non-renewable sources.

Between 2014 and 2017, 91% of the loans granted by the six major Chinese banks to the energy sector were for fossil fuel projects.

In 2018, coal-related projects accounted for 40% of energy sector loans⁸. In 2016, China was involved in 240 coal-fired power plants in the BRI countries, and this proportion had to increase.

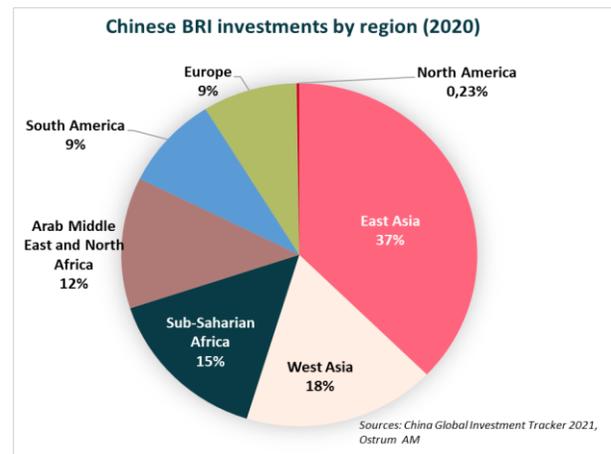
South-East Asia, a strategic region and privileged in Chinese investments

One of the other challenges of the BRI is to block the Asian “pivot” mentioned in 2011 by Barack Obama. The goal for the Obama administration was a rebalancing of US diplomatic relations to priority areas to counter China’s rise to power

South-East Asia has long been neglected by the United States because the region was poor and unstable and therefore had no economic or strategic interest at the time.

China took advantage of the void left by the United States in the region to strengthen its economic and financial presence by integrating these countries into the BRI.

This can be seen in the geographical distribution of Chinese investments under the BRI, as shown in the chart below.



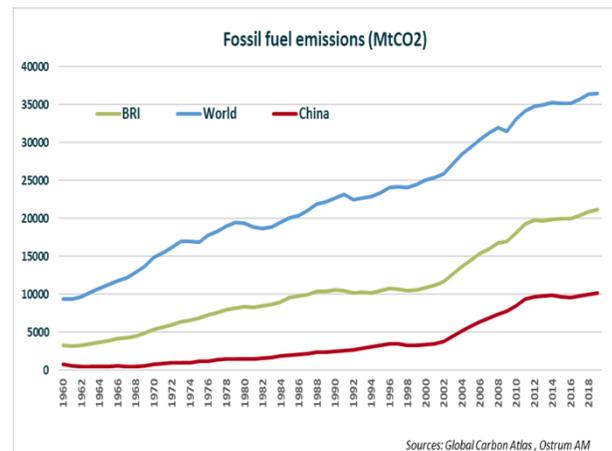
Asia receives the largest share of investments (54%) while Africa received about 27% of Chinese investments under the BRI.

As part of the new regional agreement, the Global Regional Economic Plan, signed on 15 November 2020, Chinese investments should continue to be concentrated in the region as well as in transport infrastructure.

The BRI and the Paris Climate Agreement

The BRI highlights the climate impact of infrastructure development.

Indeed, the BRI (including China) accounts for nearly 60% of global CO₂ emissions, as shown in the graph below.



⁷ According to the data from « China Global Investment Tracker 2021 ».

⁸ “Moving the Green Belt and Road Initiative from words to actions”,

Working Paper, Lihuan Zhou, Sean Gilbert, Ye Wang, Miquel Munoz Cabré, and Kevin P. Gallagher.

The Chinese initiative is therefore a major obstacle to achieving the objectives of the Paris Climate Agreement.

According to the September 2019 “Decarbonizing the Belt and Road” study, even if non-BRI countries met their greenhouse gas emission targets, non-compliance by BRI-related countries would still lead to a 2.7° C increase in global temperatures.

Moreover, the countries through which the BRI passes are for the vast majority emerging countries, which are the most exposed and the most vulnerable to the effects of climate change.

This is particularly the case for Southeast Asia, which is highly exposed to climatic hazards such as storms, floods, sea-level rise, heat waves and water stress.

The Chinese initiative is starting to be challenged by local people because of its devastating effects on ecosystems and biodiversity.

Examples include the construction of the hydroelectric dam in the Batang Toru rainforest in Indonesia, which threatens the extinction of the last 800 Tapanuli orangutans, the rarest species of great apes, and which brought the Indonesian Environment Forum challenged the project.⁹

The construction of such dams requires blocking the water of the rivers for most of the time to the detriment of the agriculture and fishing activities of the local populations, which causes social tensions.

In order to improve the reputation of the BRI, China has taken important political initiatives.

China’s signing of the Paris Climate Agreement in 2015 was a great relief to the international community, as it made it easier to achieve the goals.

In 2016, Xi Jinping committed to creating a green and sustainable BRI, that is to say, in compliance with environmental standards for infrastructure projects.

Last year, China said it was aiming to become carbon neutral by 2060.

Finally, on September 21 at the United Nations General Assembly, China committed to stop building new coal-fired electricity projects.

China began to move away from these projects and did not invest in any new coal-fired power plants in the first half of 2021, according to the Beijing-based International Institute for Green Finance.

So the commitment was made by China. The question that now arises is: How will China turn green and make the BRI sustainable? This is the question we will try to answer in this second part.

Towards a green and sustainable BRI?

China is the world leader in the renewable energy sector...

China’s investment in renewable energy is primarily a response to an emergency: air pollution.

According to the study “The 17-y spatiotemporal trend of PM2.5 and its mortality burden in China”, published on September 21, 2020, in Proceeding of the National Academy of Sciences (Pnas), air pollution has caused the premature death of 30.8 million adults since 2000 in China!

Switching from fossil fuels to renewables therefore allows the Chinese authorities to tackle the problems of air (and water) pollution and mitigate the risks of social instability.

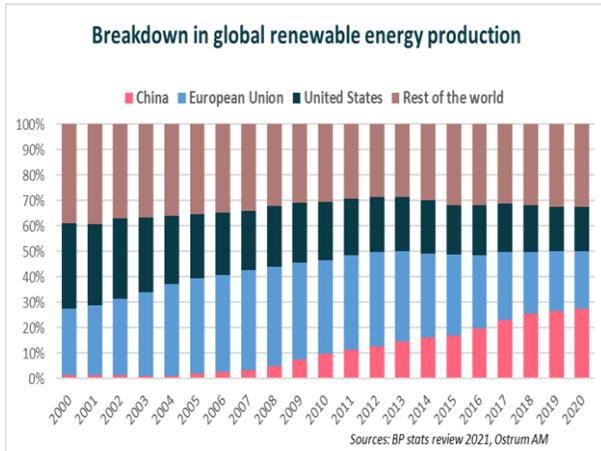
In addition to the health consequences, air pollution also has economic effects.

For example, the impact of fossil fuel-related air pollution is estimated at \$900 billion per year for China, or 6.6% of GDP¹⁰.

⁹ The World Bank had also refused to finance the project for environmental reasons. However, this did not prevent the local court from giving its green light for the continuation of the project. After the court challenge was rejected, Bank of China, which is funding the project, said it “took note of the concerns expressed by some environmental organizations”...

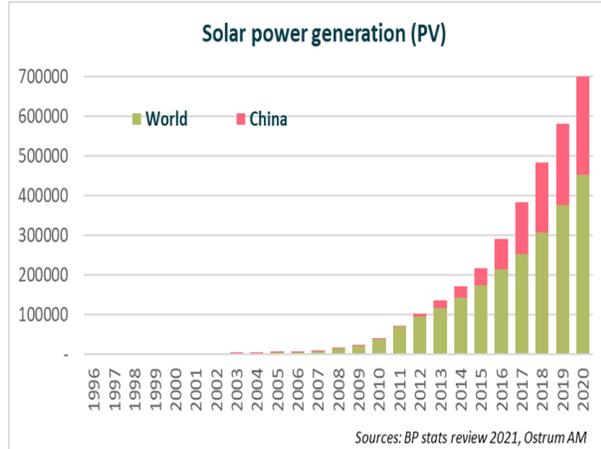
¹⁰ According to the first study to evaluate the economic cost of air pollution due to fossil fuels: “Quantifying the Economic Costs of Air Pollution from Fossil Fuels”, February 2020, CREA (Center for Research on Energy and Clean Air), quoted by the World Economic Forum.

As a result, China has invested heavily in the sector to already be at the top of renewable energy production figures, as shown in the chart below.



In 2020, China accounted for nearly 30% of global renewable energy production and surpassed the US (see chart below).

It is currently the largest producer of wind and solar energy, and the largest national and international investor in renewable energy through its investments under the BRI.



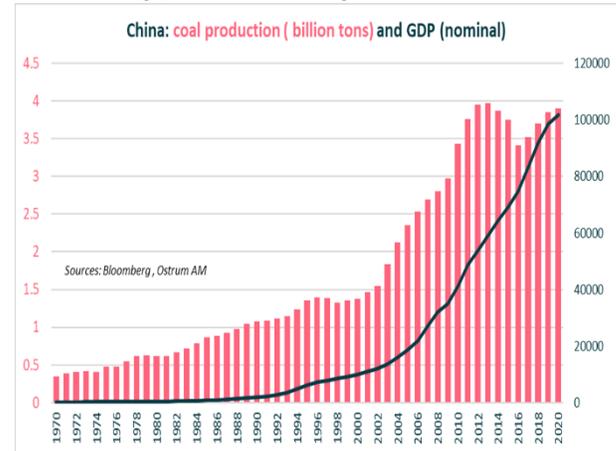
...But coal continues to have a central place in its energy mix.

China is the world's largest producer and importer of coal.

Coal continues to have an important place in its energy mix (65% of its electricity production in 2019) and to be developed by the country on its territory and abroad via the BRI. Renewable fuels (hydro, wind and photovoltaic)

account for only 27% and nuclear only 5% of its electricity production.

The reason for this is economic. The chart below shows that coal is a strong pillar of Chinese growth.



A major risk for China to maintain “a moderately prosperous society” remains the lack of energy to stimulate its economy.

Despite attempts by the Chinese authorities to suppress the construction of coal plants and shift demand to other fuels, local governments continue to build to create jobs.

On the other hand, the recent energy crisis, which has led to soaring prices for coal, gas and oil, has highlighted China's close dependence on coal in its energy mix. Faced with a high economic and social risk, the Chinese authorities have stepped up their financial support for coal and electricity production in order to guarantee supply and stabilize prices.

Does China's heavy dependence on coal call into question the green and sustainable BRI project?

BRI: Chinese investments in renewable energy meet an energy security target

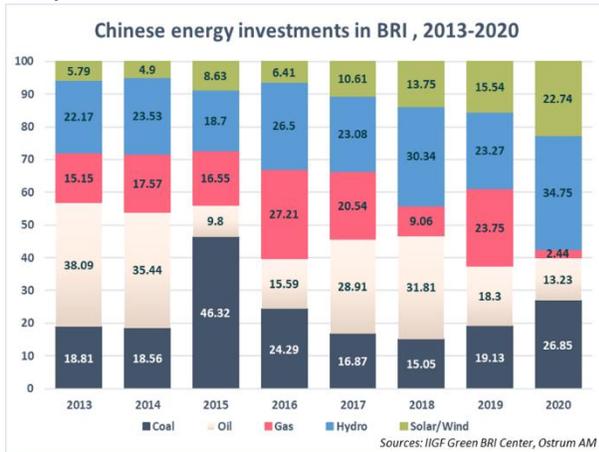
In 2020, China's BRI investment reached \$55.2 billion, down 50.2% from 2019 and 52% from 2018, linked to the COVID-19 pandemic¹¹.

However, investments in renewable energy for the first time made up the majority of Chinese energy investments under the BRI, rising from 39% to 57.5%, as shown in the chart below.

¹¹ MyStratWeekly : Emerging economies, at a crossroad.

This shift in Chinese energy investment in renewable energy is primarily in line with an energy security target for China.

By increasing the share of renewable energy in its energy mix, China mitigates geopolitical tensions by making the country less dependent on unstable regions for its energy security.



A fossil fuel market depends on securing roads for the delivery of oil and gas and therefore requires extensive military protection. On the other hand, the wind, where solar energy, has a much greater availability than fossil fuels and is much more evenly distributed among the different countries.

China has the opportunity with the BRI to improve infrastructure networks around the world in a way that is both sustainable and inclusive.

The BRI is an opportunity for China to export its renewable technologies to poor countries, especially in photovoltaics, where the country is a leader, which will have the advantage of improving the profitability and efficiency of energy projects.

The development of renewable infrastructure in developing countries is also an opportunity to reduce their dependence on fossil fuels, which will have an impact on their balance of payments, by reducing their external vulnerability.

However, the withdrawal of coal-fired power plants in some countries could disrupt their electricity production. Some countries, particularly in South-East Asia, may not be able to retire their plants on time due to the relatively young age of their plants.

The authorities recently published the “Green Development Guidelines for Investment and Cooperation Abroad”, a set of voluntary guidelines produced by Chinese university experts, governmental and non-governmental organizations

and international experts.

The report urges Chinese investors to comply with the host country’s environmental standards. When these standards are lower than those of China, the guidelines recommend the use of international environmental standards.

It should also force governments in BRI-related countries to reduce their use of natural resources in the name of “business as usual” at the expense of environmental considerations.

“Ecological civilization”

The deployment of renewable energy is also part of a broader goal for China to develop “ecological civilization” beyond its borders.

Enshrined in the Chinese constitution since 2000, and recalled by Xi Jinping in 2017, this concept is part of respect for the environment and planetary boundaries.

Ecological civilization is an inter-industry approach to reducing pollution and the use of fossil fuels, mitigating climate change and improving energy efficiency.

One of the main challenges that China faces in implementing the BRI is to deal with the complexities resulting from its interactions with diverse cultures, ecosystems, societies, and their local laws and practices.

“Ecological civilization” as an ecological framework and integrated into the green development of the BRI will allow China to standardize all these laws and practices to facilitate the development of its initiative.

It will also allow China to have more control over its foreign investment.

The B3W, rival or ally of the BRI?

Emerging countries need about \$40 trillion in infrastructure financing and development to bridge an investment gap and enable them to achieve long-term sustainable growth, particularly after the Covid-19 pandemic.

China has been the main donor of infrastructure investments for its countries, notably through the BRI.

At the first G7 summit since the pandemic, on June 11-13, U.S. President Joe Biden announced the creation of a new infrastructure financing mechanism for poor countries that should be a solution to climate change problems.

The \$35 trillion Build Back Better World (B3W) program aims to help poor countries finance greener, more transparent projects to address the impacts of climate change.

G7 members have pledged to distribute \$100 billion a year to the poorest countries to help them access greener technologies and be less dependent on coal and other polluting energies.

The B3W was presented as a competitor to the BRI, yet major differences exist between the two economic systems.

Differences in approaches

If details on the operation and funding of the G7 initiative have not yet been released (possibly at next year's G7 summit in Germany), major differences between the two economic systems can already be noted.

The B3W places human infrastructure at the heart of its global development ambitions, while China continues to develop physical infrastructure.

For example, the United States and the G7 are focusing on the promotion of health security, digital technology and gender equality, which are in line with the objectives of other initiatives such as global vaccine distribution, decarbonization and expanding education for girls.

However, the biggest difference between the two systems is "good governance".

The White House and the G7 are committed to transparency, financial, environmental and social sustainability. On the other hand, the BRI reveals important governance problems, whether they are financial (corruption, unsustainable debt of countries, etc.) or social and environmental.

These differences in the objectives of the two initiatives indicate that the two systems are diametrically opposed and cannot compete.

On the contrary, B3W and BRI appear as complementary. The objectives of the G7 Climate Initiative where gender equality is outside the BRI and vice versa.

An opportunity for developing countries?

The B3W could accelerate the improvement of the BRI, which has already made enormous progress in terms of transparency and compliance with environmental standards.

They are also new opportunities for emerging countries to finance their development and modernize their

infrastructure.

The B3W complements the many other financing mechanisms to promote their development, such as the World Bank, the Development Banks and some aid programmes from developed countries.

It could also encourage China, as part of the BRI, to offer more favourable financial terms to countries seeking its support.

Emerging countries must be able to choose freely between the two systems. However, the growing tensions between the US and China are likely to lead to two separate economic systems with no interactions and no benefits for emerging countries.

Conclusion

China is a leader in renewable energy, but remains highly dependent on coal because the lack of energy remains the major risk to boost its economy. However, China has the opportunity to improve infrastructure networks around the world in a sustainable and inclusive way while ensuring its economic and geopolitical interests. The emergence of the B3W should prompt China to accelerate the improvement of BRI. Both initiatives appear to be an opportunity for developing countries to finance their development and modernize their infrastructure. Provided that these two economic systems are complementary.

Zouhoure Bousbih

FINANCE

Climate risk / Financial risk

The financial system as a whole (banks, insurance, financial markets) is at risk with climate change. However, the channels of contagion are very varied, complex and often indirect, so it is advisable to propose a mapping of these risks. Are they taken into account correctly? If there is undeniable progress, it seems that we are far from fully embracing all the aspects: methodological problems are one of its elements. The regulator is aware of this and is also working on the issue. It could play an important driving role in the future.

Financial risk, a mapping

Measuring the risks to the financial sector related to climate impact and policies in this area has become a major topic. However, there is a debate on whether implementing climate policies under target 2°C generates systemic risk or, rather, opportunities for low-carbon investments.

A detailed analysis of these risks in Europe leads to a very contrasting picture of exposure by region, sector and financial institution.

The first risk is a physical risk related to a climate event

Natural disasters can take the form of floods, forest fires or heat waves, for example. Consideration should also be given to the potential rise in sea-level, which may be a significant risk by 2050.

A mapping of these risks requires that the hazards be geolocated. Such an approach reveals a very heterogeneous situation. The ESRB estimates in a recent study that such a combination of environmental problems could affect up to 30% of the corporate credit portfolio of euro area banks. The risk could be amplified in terms of funding through two mechanisms.

- Natural disaster could impact already weakened companies, for example because they are



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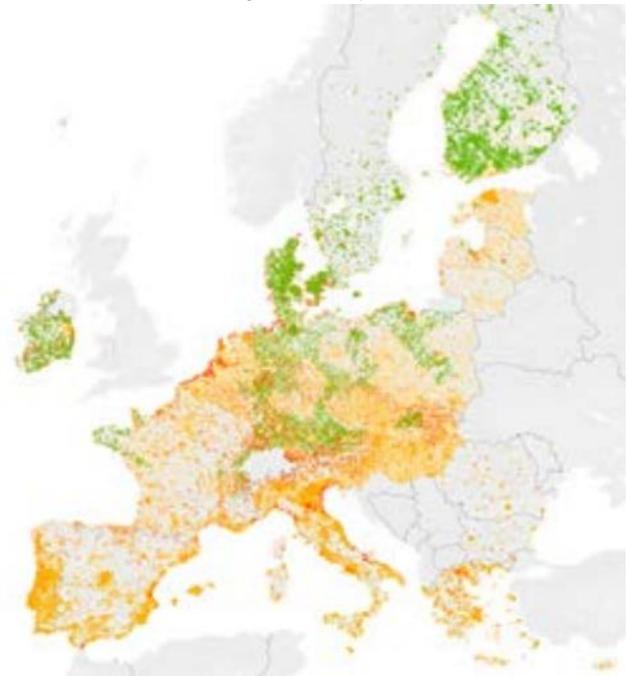
insufficiently capitalized or profitable.

- It could affect the quality of the collateral accepted by the banks. A typical phenomenon of real estate crises and that undermines the quality of banks' assets.

Again, according to the ESRB, only 35% of the potential economic risks associated with climate hazards are insured.

The map below, taken from an ECB study, shows the regional disparity of these risks.

Physical risks related to climate change,
regional analysis



Each point is a corporate head office, the risk is on a scale

of green (minor risk) to red (extreme risk).

Source: ECB

The second risk is related to the destabilization that the energy transition can create.

Risk materialization can take many forms.

- This may involve destruction of “stranded” assets¹². For example, some oil companies are forced to book provisions because some of their oil fields will never be able to be exploited. The magnitude of these “locked-in” assets in a 2°C economy has been estimated at approximately 82% of the world’s coal reserves, 49% of the world’s gas reserves and 33% of the world’s oil reserves¹³.
- It can also be a loss of competitiveness in some sectors that are too carbon-intensive or a loss of profitability that can endanger financial health.

More generally, the green transition can only take place if part of the current capital stock is destroyed in favor of greener investments. You can’t make an omelet without breaking some eggs...

The European regulator estimates that the exposure of eurozone banks to high-emitting sectors would represent on average only 14% of their balance sheet.

If the physical risk is very heterogeneous from a geographical point of view, the intensity of emissions is just as heterogeneous from one sector to another. This results in pockets of vulnerabilities due to exposure concentration. In an extreme case, the losses of the banking system could reach 10% in the event of an aggressive lowering of the credit rating attributed to high-emission companies and in the event of rapid increases in the price of carbon.

A risk of violent turnover in the financial markets.

If these risks are well documented, the debate remains open on how they are taken into account by the market. Of course, there is a very strong increase in ESG management. There is also a rapid expansion of the green bond market: the amount of green bonds in Europe now exceeds €500 billion, with issues growing by more than 20% per year.

However, it is far from clear whether the market takes into account the entire climate risk (Cf. below). In particular, it appears that the extreme risk (a “too late too sudden” adjustment) is not taken into account.

The risk then is that we will see a sectoral rotation when markets finally take into account the extent of risk. A movement that will be accompanied by its share of volatility and therefore financing problems for certain issuers.

Evidence suggests that the impacts of these risk drivers on banks can be observed through traditional risk categories

The table below summarizes the potential effects in each risk type

Risk	Potential effects of climate risk drivers (physical and transition risks)
Credit risk	Credit risk increases if climate risk drivers reduce borrowers’ ability to repay and service debt (income effect) or banks’ ability to fully recover the value of a loan in the event of default (wealth effect).
Market risk	Reduction in financial asset values, including the potential to trigger large, sudden and negative price adjustments where climate risk is not yet incorporated into prices. Climate risk could also lead to a breakdown in correlations between assets or a change in market liquidity for particular assets, undermining risk management assumptions.
Liquidity risk	Banks’ access to stable sources of funding could be reduced as market conditions change. Climate risk drivers may cause banks’ counterparties to draw down deposits and credit lines.
Operational risk	Increasing legal and regulatory compliance risk associated with climate-sensitive investments and businesses.
Reputational risk	Increasing reputational risk to banks based on changing market or consumer sentiment.

Source BIS, Cf. « Climate-related risk drivers and their transmission channels » <https://www.bis.org/bcbs/publ/d517.pdf>

¹² A “stranded asset” refers to an investment or asset that lose value due to market developments. This devaluation of assets is mainly linked to significant and sudden changes in legislation, environmental constraints or technological innovations, which then

renders assets obsolete before they are fully depreciated.

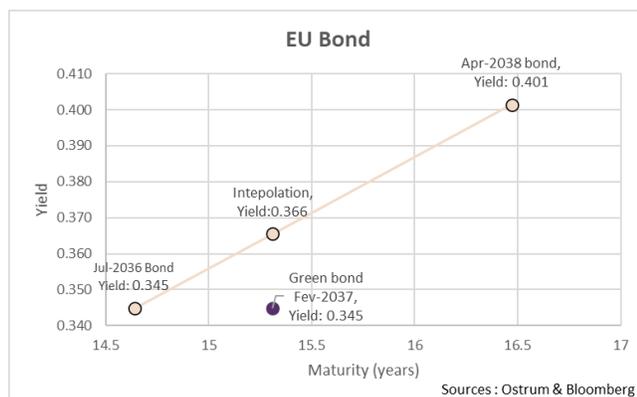
¹³ McGlade, C. & Ekins, P. (2015) « The geographical distribution of fossil fuels unused when limiting global warming to 2 °C ». Nature 517, 187–190

An underestimated risk

Progress

Financial markets are increasingly taking climate risk into account. In a recent paper, Bolton and Kacperczyk (2021)¹⁴ show that there is a carbon premium for the worst emitting companies in this area. In other words, companies with higher emissions must compensate investors by offering higher returns. Another dimension is the production of data on the domain, the impact of these data is undeniable, they have become more complete and more targeted. Mesonnier and Nguyen (2020)¹⁵ have shown that these disclosure obligations for French institutional investors have led to the disposal of 40% of fossil fuels compared to banks and investors located in other jurisdictions. Finally, Alessi et al. (2021)¹⁶ in a paper that has just been published, show the existence of a negative “greenium” for European equities: investors favor greener equities, but only if these companies are also more transparent in terms of environmental performance.

Last example, the European Union issued its first green bond last week, a bond with a maturity of February 2037. The demand was colossal, 135 billion bids at the auction, for 12 billion issued. As a result, on Friday night the rate on this bond was 0.345%. If we look at the other European bonds (June-2036 and April-2038) we can, with the help of a simple interpolation, estimate where the rate of this green bond should be. There is a difference of 2 bps (the famous “greenium”) between this theoretical value and the observed course. Investors therefore left behind 2 bps of yield to position themselves on a green bond.



A methodological problem

If climate risk is increasingly taken into account by an increasing number of investors, it would be wrong to think that the markets take it completely into account.

The first problem, perhaps the most difficult, is one of methodology. The consideration of potential future climate risks in all types of financial contracts and portfolio performance is difficult due to the very nature of climate risks. The academic literature in particular has highlighted the importance of some specific features of climate change:

- The deep uncertainty and recurrence of extreme events, known as black swan in finance and otherwise renamed green swan for climate events.
- The risk of violent inflection points, and indeed we wrote about “Minsky climate moment” in a recent publication.
- Non-linearities of this type of risk which make some of the risk measurement instruments inadequate.
- Potential domino effects that may have major impacts on co-movements of certain asset classes.

Moreover, the endogeneity between climate policies and investors' expectations of risks arising from these same policies creates the possibility of multiple equilibrium. The degree of financial risk associated with climate scenarios depends very much on how the transition is implemented. The following typology has been proposed¹⁷:

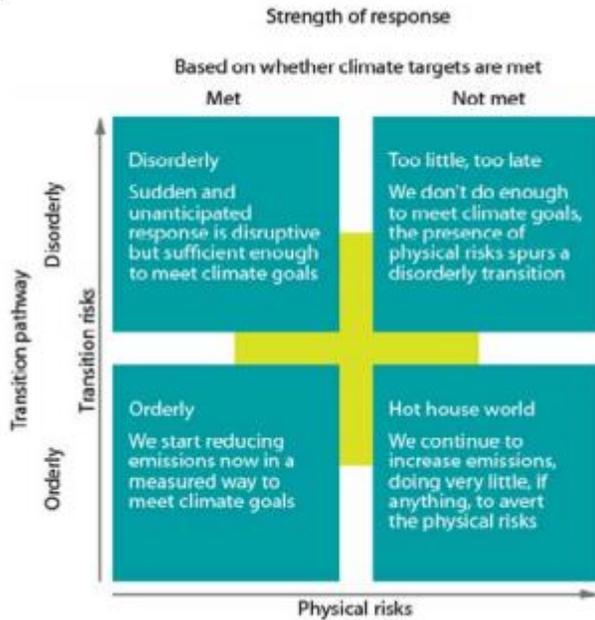
¹⁴ Bolton, P. and Kacperczyk, M.T. (2021), “Global pricing of carbon-transition risk”

¹⁵ Mesonnier, J.-S. and Nguyen, B. (2020), “Showing off cleaner hands: mandatory climate related disclosure by financial institutions and the financing of fossil energy”, Working Paper Series, No 800, Banque de France.

¹⁶ Alessi, L. et al. (2021), “What greenium matters in the stock

market? The role of greenhouse gas emissions and environmental disclosures”, Journal of Financial Stability, Vol. 54, June.

¹⁷ NGFS. 2019a. “NGFS First Comprehensive Report. A Call for Action - Climate Change as a Source of Financial Risk.” April 2019. Available at: <https://www.ngfs.net/en/first-comprehensive-report-call-action>.



As a result, the standard financial risk valuation models à la Merton and Black are inadequate to deal with the complexity of the climate and financial risks because they are based on average value analyses and deviation to the most likely. The underlying assumptions (linearity of normal processes and distributions, for example) only poorly describe climate risk.

Inadequacies, the “green swan” is not taken into account

As a result, while climate risk is undoubtedly increasingly taken into account by investors, it seems nevertheless that the risk premium does not fully reflect the extreme risks, precisely the most restrictive, etc. and the most difficult to model.

In particular, there was an IMF study last year in its “Global Financial Stability Report”, which showed that the response of equity prices to major climate shocks over the past few decades has been generally modest. The study, therefore, concludes that physical risk appears to be only partially reflected in global equity valuations¹⁸. On this same subject, we can also consult the blog of the IMF with the article “Equity investors must pay more attention to the physical risk related to climate change”¹⁹. Here too, the main problem is the partial and therefore insufficient, consideration of extreme events.

In summary, climate risk is therefore indeed taken into

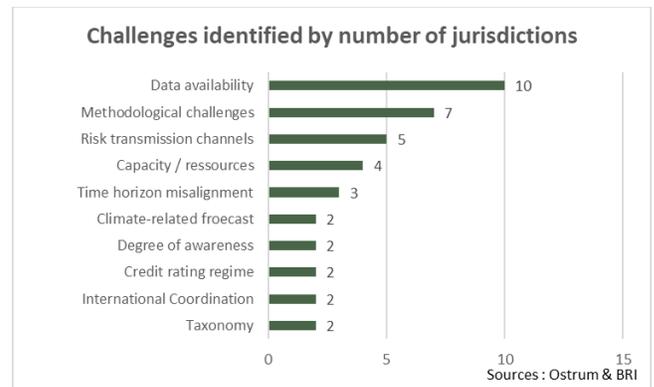
account by markets, and increasingly so. But only in a piecemeal way, the “green swan”, the extreme events, always seem to be underestimated.

The central role of the regulator

The observation we have just made is shared by a number of regulators. In particular, the Bank for International Settlements has devoted a great deal of work to this subject with the conclusion that the efforts made so far may prove insufficient.

The BIS has identified regulatory initiatives around the world on climate-related financial risks²⁰. Unsurprisingly, it found that the majority of the Basel Committee members felt that climate issues should be addressed and that financial risks should be tackled within their existing regulatory and supervisory frameworks.

In fact, an overwhelming proportion of members have done research related to the measurement of climate-related financial risks. Of the 27 entities that participated in the survey, 24 have already conducted research on the subject. The main problems of the approach are listed on the following chart:



The vast majority of members, 23 out of the 25 responses, began an outreach effort with banks through various channels. A large majority, 18 out of 24 responses, also analyzed climate risk for banks. Finally, it is important to note, in this context, that banks publish climate risk information in 20 of the 23 jurisdictions concerned.

About two-fifths of members (16 out of 27 members) have published or are in the process of publishing (5 out of 27)

¹⁸ IMF (2020), “Physical risk and equity prices”, Global Financial Stability Report, April, Section 5.

¹⁹ [https://blogs.imf.org/2020/05/29/equity-investors-must-pay-more-](https://blogs.imf.org/2020/05/29/equity-investors-must-pay-more-attention-to-climate-change-physical-risk/)

[attention-to-climate-change-physical-risk/](https://blogs.imf.org/2020/05/29/equity-investors-must-pay-more-attention-to-climate-change-physical-risk/)

²⁰ Voir <https://www.bis.org/bcbs/publ/d502.pdf>

more principled guidance on climate-related financial risks.

Conclusion

In a recent paper, the ECB concluded in two stages: “Banks must accelerate their efforts” and “banks and supervisor have very busy months ahead”. It seems that the argument can be extended to all financial markets.

While it is indisputable that progress has been made in taking climate risk into account, the road remains long. One of the risks with climate change is having to face a “too sudden too late” adjustment because of the postponement of deadlines. The argument is also valid for financial markets which do not necessarily take account of extreme events appropriately. The regulator is aware of this and could play a leading role in this transition.

Stéphane Déo

COLLABORATION COP26: the collaboration challenge

This is the last piece of our COP26 series reviewing the four challenges: Mitigation, Adaption, Finance and thus Collaboration. The efforts made so far in the fight against global warming are proving to be insufficient. Accelerating the collaboration between governments, businesses and civil society to deliver on climate goals faster is indeed of the essence.

The collaboration challenge; in search of an equilibrium

Among the four key themes of the upcoming Conference of Parties or COP26 summit in Glasgow, *collaboration* is most elusive. It can be thought of the necessary condition for the achievement of the other three main objectives, namely mitigation, adaption and finance. Collaboration is vital to help deliver on these three goals and ensure the world is genuinely moving towards a resilient, net zero economy. Committing to work together is needed to lay the foundations for faster progress. The COP have been in place since 1995, with NGOs using these events as platforms to put pressure on parties. Achieving consensus has always been a struggle.

Hard to achieve consensus : searching for an equilibrium

United Nations negotiations are always based on achieving a consensus taking into consideration the voices of the most vulnerable parties, which may be the first in line to assume the potentially high costs of the climate change and the transition from a high-carbon economy. Arguably, inequalities linked to the climate situation should be tackled by global solutions that benefit the least advantaged the most (sort of a Rawls equilibrium).



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Alternatively, parties can aim at a Nash equilibrium outcome. The Nash equilibrium defines a solution to a non-cooperative game involving several players. Each player is assumed to know the equilibrium strategies of the other players and no player has anything to gain by changing only their own strategy. If no player can increase their own expected payoff by changing their strategy while the other players keep theirs unchanged, then the current set of strategy choices constitutes a (strict) Nash equilibrium.

As concerns current climate issues, collaboration will be key to complete the set of information of all Parties regarding the possible paths forward, align expectations and help ensure that no Party can be better off (or even indifferent) by not adhering to global climate commitments.

Paris Agreement, sustainable development mechanism and collaboration

The need for collaboration has long been identified. It is explicitly referred to in Article 6 of the Paris Agreement, the international treaty on climate change, adopted in 2015, which covers climate change mitigation, adaptation and finance. The Agreement was negotiated by 196 parties. Paragraphs 6.4-6.7 establish a mechanism "to contribute to the mitigation of greenhouse gases and support sustainable development". The principles of a sustainable development mechanism (SDM) hence point to enhanced collaboration between countries. The SDM is the successor to the Clean Development Mechanism, a mechanism under the Kyoto Protocol by which parties could collaboratively pursue greenhouse gas (GHG) emissions reductions.

The SDM encompasses the dual goal of contributing to reductions in global GHG emissions and supporting sustainable development. Also, the SDM is available to all

parties as opposed to mostly developed countries in the previous Kyoto protocol, making it much wider in scope.

More recently, in April 2020, the Petersberg dialogue took place to mobilize countries around the world ahead of the COP26 UN climate summit. In the midst of the Covid crisis, parties sent a clear message that the fight against climate change must be placed at the center of the stimulus plans. Promises must now be put into action.

The countries that signed the Paris Agreement in 2015 had also committed to submitting new climate ambitions by July 31, 2021 to limit global warming to a maximum of 2 degrees. By the day after the deadline, half of the countries had not submitted theirs, including the largest CO₂ emitters like China and India. In addition, Turkey and India have sought more measures by developed nations with a historic responsibility for global warming. Only a little more than half of them, or 110 Parties out of 197, have submitted their new Nationally Determined Contributions (NDCs).

However, the results are better than in December 2020, where we counted in all and for all 75 NDCs submitted. Among the new contributions is that of the United States, the world's second-largest polluter, back in the Paris Agreement following the election of Joe Biden. But neither China nor India, the first and third largest emitter of CO₂, have yet filed theirs. On August 10, Australia reaffirmed its refusal to set a carbon neutral target, believing that the country would achieve it "as soon as possible". These NDCs must be included in a summary report that will be published ahead of the major international climate meeting.

COP26 : pressing issues and hopes for breakthrough

The most pressing issues ahead of the COP26

The COP26 may be the most important summit in years. The major goal of COP26 is to renew climate commitment and put Paris into action. The most pressing issues is to review progress and outline the path forward in the fight against climate change for the 200 Countries participating.

The objective is to cut GHG by 45% by 2030 vs. 2010 on a path to net zero by 2050. However, the world is on track with 2.7 degrees as emissions are some 55-60% above target. COP26 in Glasgow is thus the first opportunity to update NDCs since Paris. There is another important goal pertaining to funding of transition investments. Parties had committed to send US\$100B a year to developing nations but in 2019, yet only US\$ 80B has been financed. High-income

countries will thus be under pressure to raise contributions. Representatives of small-island states and Sub-Saharan Africa have called for a doubling of the developed nations' pledge of \$100B annually. Furthermore, an effective reporting structure to keep track of contributions is missing.

All parties agree that finalizing the rules needed to implement the 'Paris Rulebook' is a top priority. This is for instance about creating the conditions so that decarbonation occurs in keeping with country commitments. Carbon markets can enable great ambition in mitigation and adaption actions, but their proper functioning and incentive mechanisms may not be fully understood by all parties. It will require finding common ground as regards transparent reporting in a bid to support efforts from around the world to meet the climate commitments and hence keep the 1.5C-degree target alive.

As regards energy production and CO₂ emissions, there is an explicit objective to concise coal to history, which requires cutting electricity output by a whopping 4TW/h. So far G20 has failed to agree on phasing out coal-fired power plants. Coal-fired output indeed still accounts for 45% of world GHG emissions. In other words, the current use of coal is still about 4 times the limit set for net zero. China and other countries recently com-mitted to stop funding of coal power overseas but domestic producers continue to operate. Incidentally, Beijing just ordered local producers to raise output to tackle the current energy crisis, brought about by inadequate inventories of gas and oil leading to an outsized shift in demand for coal. In the UK, coal use in electricity generation has risen in response to skyrocketing natural gas prices. Finally, in the US, the passage of the infrastructure bill, including clean-energy investments, hinges on the vote of Senator Joe Manchin, from West Virginia, where coal mining remains an important industry. Local politics often stand in the way of burden sharing on global issues.

Hence the current energy crisis sets a high bar for any breakthrough agreement on coal. The UK's lead and influence in international negotiations has certainly weakened since Brexit. Furthermore, the empty-chair policy of the Chinese President Xi Jinping at the upcoming COP26 is certainly not good news. Xi Jinping's absence (and possibly Putin's) will drastically reduce Glasgow's political reach.

Consensus building for a methane emission cut

Political support for a global agreement on methane emissions is building slowly, as another 25 countries joined the US and EU-led pledge launched in September to cut pollution from the potent greenhouse gas. New support from Japan, Canada and Germany took the total to 34 parties to reduce emissions by about a third over the next decade.

Tackling methane was the “single fastest strategy” to keeping the 1.5C-degree goal within reach.

The US-EU led initiative was launched with nine parties onboard but a “critical mass” of more than 100 countries may still be needed. However, major emitters including China, India and Brazil are yet to sign up. Major sources of methane are gas pipeline leaks, ruminant animals including cows, rice production and waste facilities such as landfill sites. While tackling methane from the oil and gas sector is relatively simple, reducing the pollution from agriculture is much harder.

As is the case for coal, it will be interesting to see whether a global consensus on methane emissions can be reached in the context of the current global gas crisis. Russia is being accused by the US to weaponize energy supplies and indeed decided against increasing natural gas flows to Europe, as the final approval of the Nordstream 2 pipeline remains under consideration by the European Union. There may be broader issues at stakes but any global agreement on methane emissions will require all parties to look beyond the current crisis.

Arbitrations, climate and the involvement of all stakeholders

Finalizing the Paris Rulebook is not enough to deliver net zero. Governments, business and civil society (including non-government organizations for instance) need to work together. The task is enormous as it relates to picking solutions to, among other things, transform the ways we produce energy for households and businesses alike, grow our food, develop infrastructure and move people and goods around. The energy transition towards a net zero global economy will require arbitrations, involving governments, the civil society and the corporate sector. In other words, the path to decarbonize mobility requires a holistic approach and the cooperation of all stakeholders.

For example, the metals supply situation does not seem to add up. On current estimates, 40 times more lithium is to be used by 2040 than in 2020, 20 times more nickel, 7 times more manganese and 2.5 times more copper. These figures are the projections of the International Energy Agency if we follow the sustainable development scenario. The development of diffuse renewable energies (wind and sun) and the electric car implies very high demand for various metals. Excluding steel, there are indeed 10 times more metals (by weight) in an electric car than a thermal power unit car, and it takes 20 to 30 times more copper per electric MWh for diffuse modes than for concentrated modes (including

nuclear energy). This therefore means 10 to 20 times more mining... assuming that the raw materials are indeed available for a prolonged period of time (to qualify for the “sustainable” part). In parallel, it is worth keeping in mind that 28 mining multinationals (ICMM members) operating on 650 sites in 50 countries have themselves committed to net zero CO₂ emissions, direct or indirect by 2050 or earlier. More efficient machinery will help. At this juncture, it is unclear whether reduced emissions will be consistent with higher output to match demand for metals.

Think global, act local

Concrete examples of cross-sector collaborations at the local level: the benefits of clusters

It is fair to say, that despite government posture and politics around COP26, there is considerable momentum in the private sector on the climate issue, in Europe, in the US and more recently even in Asia.

There are great examples of local agreement. Uppsala is the fourth largest city of Sweden. Local authorities have decided that it will aim at being fossil-fuel free by 2030 and climate-positive by 2050. Hence the city aims below a net zero target set in the Paris accord. To do this, since 2010, city officials and stakeholders have set up a cooperative network, referred to as a local Paris agreement. The Upsala protocol involves 37 active members from all sectors of society to contribute to climate targets. This local initiative could be replicated elsewhere in the world.

There is strong evidence of the benefits of forming clusters in research and development. Such clusters can be defined as a dynamic mix of start-ups, SMEs, large businesses, research organizations, investors, business angels, community actors and public bodies which are 1) physically close together, 2) committed to colearning and co-creating innovation on a specific climate-related challenge, and 3) focused on turning ideas into solutions. In the UK, the Sustainable Scotland Network (involving public sector professionals engaged in sustainability and climate action) has published a report evaluating needs for collaborative clusters of organizations on climate. The report²¹, ‘*Hydrogen’s Contribution to Climate Innovation Clusters*, examines the activity and impact of hydrogen clusters on reducing GHG. With hydrogen proposed as a solution across different energy sectors, initiatives have taken place to develop technologies and address challenges of hydrogen as a new source of energy. SSN liaises with broader initiatives. The European Institute of Innovation and

²¹ The report can be found on the SSN website: <https://sustainablescotlandnetwork.org/uploads/store/mediaupload/>

[1208/file/SSN_Report_Hydrogen_ONLINE.pdf](https://sustainablescotlandnetwork.org/uploads/store/mediaupload/1208/file/SSN_Report_Hydrogen_ONLINE.pdf)

Technology's Climate-KIC is Europe's largest public-private partnership for action on climate change. It was set up in 2010 by the EIT, an EU body. It has developed a strong foothold in the UK and Ireland since, with centres in Edinburgh, London, Birmingham and Dublin. Let's hope Brexit does not compromise cross-border initiatives on global issues like climate.

Conclusion

There are undeniably significant challenges to breakthrough agreements at COP26 on higher NDCs on CO₂ emissions and the use of coal in the context of the global energy crisis. Meanwhile, there is momentum in the local private and public sectors to help converge to net zero.

Axel Botte

Additional notes

Ostrum Asset Management

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